REMARKS

Claims 1-13 were pending in the application. By this amendment, Claim 13 is canceled and amendments are presented for Claims 1, 7, 8 and 12. Claims 1-12 are now pending.

The Examiner has rejected Claims 12-13 under 35 USC 101 as directed to non-statutory subject matter. Applicants have amended Claim 12 and have canceled Claim 13. The Examiner has rejected Claims 1-13 (now 1-12) under 35 USC 102(b) as anticipated by Yamaguchi. For the reasons set forth below, Applicants believe that the claims, as amended, are patentable over the cited art.

The present application teaches and claims a system and method for speech recognition for recognizing original speech even when the original speech is superimposed with an echo generated by the environment. The present application expressly teaches that "in consideration of the long impulse response, an echo can be sufficiently simulated even if the echo is assumed to be superimposed onto a speech signal $0(\omega, t)$ to be determined at the current time point while being dependent on a speech signal $0(\omega, tp)$ in the immediately previous frame. That is, by using the formula (2) above to determine acoustic model

data with the highest likelihood for a speech signal from a predetermined acoustic model data and the value of α (i.e., the echo prediction coefficient), it is possible to use a corresponding language model data to perform speech recognition using only a speech signal from one channel" (page 25, lines 6-15). The present application further teaches that "speech input as a reference signal is not required" (page 11, lines 18-19). Accordingly, in contrast to prior art speech recognition systems which require multiple model training iterations and/or multiple input channels, the present invention can dynamically calculate an echo prediction coefficient to generate echo speech model data for generating adapted acoustic model data.

The Yamaguchi patent is directed to a scheme for model adaptation in pattern recognition based on Taylor expansion. Specifically, the Yamaguchi patent detects a change in a parameter representing a condition of pattern recognition (e.g., noise during speech recognition) based on a change in that condition between when the model was created and when the pattern recognition using the model is being done. For example, when speech recording conditions differ at the time of actual recognition (Col. 1, lines 29-33) then the Yamaguchi system calculate the difference between the original (i.e., at time of creation of the

"initial noisy speech") and current (i.e., at time of recognition) conditions (Col. 11, lines 41-45) and generates an adapted noisy speech model to be used for recognizing speech under the current conditions. Yamaguchi teaches "[i]n the model adaptation apparatus of Fig. 3, first at a time of model training, the initial noise HMM is obtained from the background noise that is entered at a speech input unit 1 and extracted at a noise extraction unit 2" (see: Col. 11, lines 23-26). Accordingly, Yamaguchi requires both an earlier acquired control noise signal and an earlier acquired speech input signal to create the models. Thereafter, Yamaguchi adjusts the models based on new noise input.

Applicants respectfully assert that the Yamaguchi patent does not anticipate the invention as claimed. With specific reference to the claim language, Yamaguchi does not teach a speech recognition steps and means for storing a feature quantity acquired from a current speech signal for each frame; storing acoustic model data and language model data, respectively; an echo adaptation model generating portion for generating echo speech model data from a speech signal acquired immediately prior to a current speech signal to be processed at the current time point and using the echo speech model data to generate

adapted acoustic model data; and recognition processing means for utilizing said feature quantity, said adapted acoustic model data and said language model data to provide a speech recognition result of the speech signal.

With respect to the claim feature of steps and means for storing a feature quantity acquired from a current speech signal for each frame, the Examiner cites Fig. 3 of Yamaguchi and states that "figure 3 includes a buffer memory for temporarily storing the received speech signal for processing." Applicants respectfully state that there is no illustrated buffer memory. The Yamaguchi Fig. 3 shows storage locations for noise, clean speech, noisy speech and Jacobian matrix memory units. Yamaguchi does not teach or illustrate a buffer memory. Moreover, the illustrated storage locations for Yamaguchi are not provided for storing a feature quantity acquired from a speech signal.

With respect to the claim feature of steps and means for storing acoustic model data and language model data, respectively, Applicants acknowledge that Yamaguchi stores noise, clean speech, and noisy speech. That is not the same as or suggestive of storing acoustic model data and language model data. The Examiner states that "language model or grammar or dictionary is inherently included in

the speech recognizer 13" of figure 3. Applicants disagree. There are speech recognizers that do not include language those components. Applicants remind the Examiner that an anticipation rejection requires that each and every claim feature be taught by the reference. See: In re Schreiber, 128 F. 3d 1473, 1477, 44 USPQ2d 1429, 1431 (Fed. Cir. 1997); In re Paulsen, 30 F. 3d 1475, 1478-1479, 31 USPQ2d 1671, 1673 (Fed. Cir. 1994); In re Spada, 911 F. 2d 705, 708, 15 USPQ2d 1655, 1657 (Fed. Cir. 1990) and RCA Corp. v. Applied Digital Data Sys., Inc., 730 F. 2d 1440, 1444, 221 USPQ 385, 388 (Fed. Cir. 1984). Further, even for a sustainable obviousness rejection, the Federal Circuit has stated that the obviousness determination "must be based on objective evidence of record". (In re Lee, 277 F. 3d 1338, 1343 (Fed. Cir. 2002)) and that "conclusory statements" by an examiner fail to adequately address the factual question of motivation, which is material to patentability and cannot be resolved "on subjective belief and unknown authority" (Id. at 1343-1344). Accordingly, the Examiner cannot simply conclude that the Yamaguchi speech recognizer has components that are not expressly taught.

With respect to the claim feature of the steps and echo adaptation model generating portion for generating echo

speech model data from a speech signal acquired immediately

prior to a current speech signal to be processed at the

current time point and using the echo speech model data to

generate adapted acoustic model data, the Examiner

concludes that Figure 3 shows "Updating HMM". Applicants

note that Figure 3 does not show updating of the HMM and

does not illustrate an echo adaptation model generating

portion as claimed. Applicants disagree with the

Examiner's conclusion that "echo" and "noise" are

synonymous. The term "echo" is defined in the present

specification (page 10, line 19-page 11, line 3) as "an

acoustic signal which gives influence longer than the time

width of the observation window." Applicants disagree with

the Examiner's statement that "any noise source that is

generated by the environment is considered an echo signal".

An echo has a unique relationship to input speech, which

does not exist with other environmental noise. The present

invention provides a way to determine an absolute value of

an echo (see: page 21, line 19 through page 22, line 2)

dynamically and to perform more accurate speech recognition

when an echo is present.

Finally, the Examiner concludes that Yamaguchi's Fig. 3 shows a recognition processing means for utilizing said feature quantity, said adapted acoustic model data and said language model data to provide a speech recognition result of the speech signal as claimed. Applicants reiterate that Yamaguchi does not teach or suggest the storing of feature quantities from current speech signals or an adapted acoustic model generated using the echo adaptation model generating portion operating on current speech signals. Further, Yamaguchi's Fig. 3 provides no teaching or illustration of speech recognition using those features and components.

Anticipation under 35 USC 102 is established only when a single prior art reference discloses each and every element of a claimed invention. See: In re Schreiber, 128 F. 3d 1473, 1477, 44 USPQ2d 1429, 1431 (Fed. Cir. 1997); In re Paulsen, 30 F. 3d 1475, 1478-1479, 31 USPQ2d 1671, 1673 (Fed. Cir. 1994); In re Spada, 911 F. 2d 705, 708, 15 USPQ2d 1655, 1657 (Fed. Cir. 1990) and RCA Corp. v. Applied Digital Data Sys., Inc., 730 F. 2d 1440, 1444, 221 USPQ 385, 388 (Fed. Cir. 1984). Since the Yamaguchi patent reference does not teach all of the claimed features, as outlined above, it cannot be concluded that Yamaguchi anticipates the invention as claimed.

Based on the foregoing amendments and remarks, Applicants respectfully request entry of the amendment, reconsideration of the rejections, and issuance of the claims.

Respectfully submitted,
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